

BAA 07-45

Electromagnetic Pulse Tolerant Microwave Receiver Front-End

(This BAA is a re-publication of DARPA BAA 07-19 suspended on 13 February 2007)



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The Defense Advanced Research Projects Agency (DARPA) often selects its research efforts through the Broad Agency Announcement (BAA) process. The BAA will appear first on the FedBizOpps website, <http://www.fedbizopps.gov/> and Grants.gov website at <http://www.grants.gov/>. The following information is for those wishing to respond to the BAA.

DARPA is soliciting innovative research and development (R&D) proposals to address the survivability of microwave receiver front-ends from high energy threats. The objective is to create a microwave receiver front-end which can withstand high energy exposure without compromising receiver sensitivity, bandwidth, or dynamic range.

Proposed Electromagnetic Pulse Tolerant Microwave Receiver Front-End R&D should investigate innovative approaches that enable revolutionary advances in science, devices, circuits, and communication systems. The experimental studies, supported by realistic modeling, may be carried out through collaborations between different participants as needed to achieve the goals of each Phase of this program. Specifically excluded is R&D that primarily results in incremental or evolutionary improvements to the existing state of practice.

BACKGROUND AND DESCRIPTION

Modern military platforms are highly dependent on microwave systems for their on-board communications, radar, and electronic warfare systems. Therefore the ability to protect these systems from high energy threats, such as high power microwave (HPM) weapons, directed energy weapons, or electromagnetic pulses (EMPs) that arise from nuclear blasts, is increasingly important to the effectiveness of the military.

The urgency of this problem has been cited in a Graham Commission Report to the United States Congress on July 22, 2004: *“The high-altitude nuclear weapon-generated electromagnetic pulse (EMP) is one of a small number of threats that has the potential to hold our society seriously at risk and might result in defeat of our military force ... The current vulnerability of our critical infrastructures can both invite and reward attack if not corrected.”*

The microwave receiver front-end, which is comprised of components that reside between the antennae and the signal processing electronics, is particularly vulnerable to high energy exposure. Receiver front-ends cannot use conventional metallic enclosures to provide shielding from electromagnetic radiation due to the functional necessity to transmit and receive electromagnetic signals with high sensitivity, bandwidth, and low noise. As a result, the receiver front-end is exposed to the environment, leaving its components (i.e. the entire RF to IF chain) vulnerable to semiconductor junction breakdown, arcing, thermal, and electromigration induced damage that may accompany a high energy attack.

At present, state of the art power limiters for microwave receiver front-ends do not sufficiently protect against the extraordinarily high electric fields that arise from EMPs, HPM, or directed energy weapons. Hence, there is a need for a robust and sensitive microwave receiver front-end which can survive high energy exposure with nanosecond response time and maintain high sensitivity, high spur-free dynamic range (SFDR), and high bandwidth over a large operating frequency range. In addition, conducted electromagnetic interference (EMI) levels and paths for this RF front-end must be mitigated to safe levels compatible with conventional backend CMOS electronics.

PROGRAM OBJECTIVES AND STRUCTURE

The objective of the Electromagnetic Pulse Tolerant Microwave Receiver Front-End program is to develop a novel robust and sensitive microwave receiver front-end capable of surviving high energy electromagnetic attacks. The robust RF front-end technology developed should be scalable to operate within the 0.5-18 GHz frequency band over as large a fractional bandwidth as feasible while maintaining high sensitivity. The program will culminate in a full system performance demonstration leading to military system transition opportunities. Specific program stretch goals include developing a novel microwave receiver front-end architecture capable of all of the following:

- Surviving an incident 100 MW/m^2 power flux for more than 1 ms, entirely within the receive system's instantaneous bandwidth of operation with
 - -171 dBm/Hz sensitivity (not in the presence of high power microwaves)
 - $130 \text{ dB-Hz}^{2/3}$ 2-tone SFDR (not in the presence of high power microwaves)
 - As large an instantaneous bandwidth as the technology permits
 - Scalable technology solutions applicable within the 0.5-18 GHz frequency range
 - Nanosecond turn-on times
 - Microsecond recovery times
 - Full system demonstration

Note that the above incident power flux requirement does *not* include any necessary concentration by an antenna that may be required to meet the sensitivity goal.

The Electromagnetic Pulse Tolerant Microwave Receiver Front-End program will be conducted in three phases, each having definite and measurable milestones, the most critical of which will be referred to as Go/No-Go (GNG) metrics, listed in the table below. Phase I will focus on developing and demonstrating the survivability and turn-on/recovery times of the enabling front-end technologies with a path to meet the sensitivity, dynamic range, bandwidth program stretch goals. Phase II will focus on improving front-end sensitivity, dynamic range and bandwidth. The final phase will consist of a full system demonstration. That is, an entire RF front-end receiver system satisfying all Phase II GNG performance metrics will be demonstrated. Additional component-level development will also continue in the final phase to strive towards the Phase III (end-of-program) stretch goals.

Successful proposals shall include a detailed plan for testing and demonstrating the technologies under development; of particular interest is high power radiation testing to demonstrate survivability. With regards to testing, it is anticipated that it will be extremely difficult to generate the desired power flux level (100 MW/m^2) for the entire desired pulsewidth (1 ms). It is sufficient for proposers to demonstrate survival of a $1 \mu\text{s}$ pulse by direct testing, and demonstrate the full 1 ms survival through analysis.

Several of the GNG metrics will be set in the proposal. The aggressiveness of the proposed development schedule, with respect to meeting (or exceeding) the stretch goals

in an efficient time frame, will be a factor considered as part of the source selection process. It is envisioned that the focus of each phase will concentrate on meeting the following:

- Phase 1 – Power threshold and turn-on/recovery time metrics with proposal defined sensitivity, dynamic range and instantaneous bandwidth
- Phase 2 – Improved sensitivity, dynamic range and instantaneous bandwidth
- Phase 3 – Full performance specifications and technology demonstration

To provide some consistency for comparing various technology solutions, all GNG metrics shall be measured and system demonstrations shall be conducted at a center frequency in the 8-12 GHz range over as large an instantaneous bandwidth as proposed by the performer. However, successful proposals must describe how the proposed device solution can be scaled to operate across the entire 0.5–18 GHz frequency range with uncompromised performance. RF front-end solutions that provide for large fractional instantaneous bandwidths are desired. Proposals shall define an instantaneous bandwidth GNG metric (also centered in the 8-12 GHz range as chosen by the performer based on technology and system demonstration considerations). It is expected that by the end of the program, a minimum of 1 GHz instantaneous bandwidth will be achieved, with successful proposals pushing beyond.

Go/No-Go Metric	Phase I	Phase II	Phase III Stretch Goals
Duration	To Be Proposed	To Be Proposed	To Be Proposed
Power Threshold	100 MW/m ² (for 1 ms)	100 MW/m ² (for 1 ms)	100 MW/m ² (for 1 ms)
Instantaneous Bandwidth (centered within 8-12 GHz)	To Be Proposed	To Be Proposed	> 1 GHz minimum (To Be Proposed)
Sensitivity	To Be Proposed	-168 dBm/Hz	-171 dBm/Hz
2-tone SFDR	To Be Proposed	115 dB-Hz ^{2/3}	130 dB-Hz ^{2/3}
Turn-on/ Recovery Time	ns/μs	ns/μs	ns/μs

Evaluation of proposals will be accomplished through a technical review of each proposal using the following criteria, which are listed in descending order of relative importance:

(1) Overall scientific and technical merit; (2) Potential contribution and relevance to DARPA mission; (3) Relevance and aggressiveness of intermediate milestones and GNG metrics in an efficient time frame; (4) Plans and capability to accomplish technology transition (5) Offeror's capabilities and related experience; (6) Realism of the proposed schedule; and (7) Cost reasonableness and realism. Cost/price reasonableness will be made prior to the award.

Proposals which do not provide a well defined path to a robust and sensitive microwave receiver front-end will not be considered for this program. However, DARPA reserves the right to consider compelling proposals with highly innovative technical approaches that fall short of the above program goals. Those offering such proposals should provide

unambiguous physical arguments, based on data, simulations, and calculations, leading to estimates of practical *and* fundamental performance limits in operational parameters of the envisioned robust and sensitive microwave receiver front-end.

TECHNICAL AREAS OF INTEREST

The Electromagnetic Pulse Tolerant Microwave Receiver Front-End program targets a single technical area of interest. As such, the Government **strongly prefers** an integrated experimental and theoretical approach which includes concept formulation and modeling, experimental verification, and device optimization.

- I. *Modeling, Design, Fabrication and Testing:* Design of the robust and sensitive microwave receiver front-end should be supported by realistic modeling of the effects of high energy attacks. The model should incorporate experimentally derived parameters and should help in understanding the durability of the proposed device concept. The Electromagnetic Pulse Tolerant Microwave Receiver Front-End program will require innovative approaches to realize a microwave receiver front-end which can withstand high energy exposure without compromising receiver sensitivity, bandwidth, or dynamic range. Particularly encouraged are novel ideas to suppress or eliminate arcing, thermal, and electromigration induced damage that accompany a high energy attack.

DELIVERABLES

The Government expects to be able to test structures and devices in order to validate performance consistent with the GNG metrics. Such deliverables may be submitted for testing, before the end of each Phase, to a Government entity identified by DARPA. The definition and details of the deliverable schedule should be clearly outlined in the proposal.

PERIOD OF SOLICITATION

This BAA will remain open from 15 May 2007 through 15 May 2008. The due date for proposal submission is **27 July 2007 (1600 EST)**. Proposals submitted after 27 July 2007 will be accepted, but are not likely to be funded during the first round of program funding.

SUBMISSION GUIDELINES

Proposals should be submitted electronically using one of the following two submission methods. Note that dual submissions are not required and a paper copy is not required.

1. Proposals may be submitted to this BAA via the Grants.gov web site, <http://www.grants.gov/>, by using the "Apply" function.
2. DARPA/MTO will also employ an electronic upload process, the Technical Financial Information Management System (T-FIMS) Proposal Submission System, for proposal

submissions to this BAA. Electronic proposals should be in Microsoft Word format or PDF and submitted via a web site interface: Web Site: <https://www.tfims.darpa.mil/baa>.

PROPOSER REGISTRATION

Organizations planning to submit proposals must register at: <http://www.tfims.darpa.mil/baa>. Only the lead or prime organization should register. One registration per proposal should be submitted. This means that an organization wishing to submit to multiple technical topic areas should complete a single registration for each proposal. By registering, the Proposer has made no commitment to submit. The deadline for T-FIMS registration is 20 July 2007. Please note: if the registration date is missed, the offeror may not be able to upload their proposal by the published proposal submission due date.

The T-FIMS Proposal Submission System can support the following file formats: Portable Document Format (PDF), Word Document (doc), Plain Text (txt), Comma-separated Values (CSV), PowerPoint Presentation (ppt), Excel Worksheet (xls), and Excel Workspace (xlw). Proposal submissions made through the T-FIMS Proposal Submission System must be no larger than 50 megabytes per file.

All material submitted electronically must be UNCLASSIFIED. Please DO NOT attempt to submit a CLASSIFIED material proposal through an electronic upload process as this is PROHIBITED. Offerors that intend to include classified, or potentially classified, information or data as part of their proposals shall submit an UNCLASSIFIED PROPOSAL referring to a classified annex. The offeror should contact the Technical POC for this RA, or the Security POC cited below, for guidance on submitting the classified annex.

SUBMISSION PROCESS

The typical proposal should express a consolidated effort in support of one or more related technical concepts or ideas. Disjoint efforts should not be incorporated into a single proposal.

Restrictive notices notwithstanding, proposals may be handled, for administrative purposes only, by a support contractor. This support contractor is prohibited from competition in DARPA technical research and is bound by appropriate nondisclosure requirements. Proposals and proposal abstracts may not be submitted by fax or e-mail; any so sent will be disregarded.

Awards made under this BAA are subject to the provisions of the Federal Acquisition Regulation (FAR) Subpart 9.5, Organizational Conflict of Interest. All offerors and proposed subcontractors must affirmatively state whether they are providing scientific, engineering and technical assistance (SETA) or similar support to any DARPA technical office(s) through an active contract or subcontract. All affirmations must state which office(s) the offeror supports, and identify the prime contract number. Affirmations should be furnished at the time of proposal submission. All facts relevant to the existence or

potential existence of organizational conflicts of interest, as that term is defined in the FAR 9.501, must be disclosed. The disclosure shall include a description of the action the offeror has taken, or proposes to take, to avoid, neutralize or mitigate such conflict.

Proposals selected for funding are required to comply with provisions of the Common Rule (32 CFR 219) on the protection of human subjects in research (<http://www.dtic.mil/biosys/downloads/32cfr219.pdf>) and the Department of Defense Directive 3216.2 (<http://www.dtic.mil/whs/directives/corres/html2/d32162x.htm>). All proposals that involve the use of human subjects are required to include documentation of their ability to follow Federal guidelines for the protection of human subjects. This includes, but is not limited to, protocol approval mechanisms, approved Institutional Review Boards (IRBs), and Federal Wide Assurances. These requirements are based on expected human use issues sometime during the entire length of the proposed effort. For proposals involving “greater than minimal risk” to human subjects within the first year of the project, performers must provide evidence of protocol submission to a federally approved IRB *at the time of final proposal submission to DARPA*. For proposals that are forecasted to involve “greater than minimal risk” after the first year, a discussion on how and when the proposer will comply with submission to a federally approved IRB needs to be provided in the submission. More information on applicable federal regulations can be found at the Department of Health and Human Services – Office of Human Research Protections website (<http://www.dhhs.gov/ohrp/>).

EVALUATION CRITERIA/EVALUATION AND FUNDING PROCESSES

Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons.

For evaluation purposes, a proposal is the two-volume document described in PROPOSAL FORMAT (see below). Other supporting or background materials submitted with the proposal will be considered for the reviewer's convenience only and not considered part of the proposal.

Evaluation of proposals will be accomplished through a technical review of each proposal using the following criteria, which are listed in descending order of relative importance:

(1) Overall scientific and technical merit; (2) Potential contribution and relevance to DARPA mission; (3) Relevance and aggressiveness of intermediate milestones and GNG metrics in an efficient time frame; (4) Plans and capability to accomplish technology transition (5) Offeror's capabilities and related experience; (6) Realism of the proposed schedule; and (7) Cost reasonableness and realism. Cost/price reasonableness will be made prior to the award. The following are descriptions of the above listed criteria.

1. OVERALL SCIENTIFIC AND TECHNICAL MERIT

The proposed technical approach is feasible, achievable, complete and supported by a proposed technical team that has the expertise and experience to accomplish the proposed tasks. Task descriptions and associated technical elements provided are complete and in a

logical sequence with all proposed deliverables clearly defined such that a final product that achieves the goal can be expected as a result of award. The proposal identifies major technical risks and planned mitigation efforts are clearly defined and feasible.

2. POTENTIAL CONTRIBUTION AND RELEVANCE TO THE DARPA MISSION

The potential contributions of the proposed effort with relevance to the national technology base will be evaluated. Specifically, DARPA's mission is to maintain the technological superiority of the U.S. military and prevent technological surprise from harming our national security by sponsoring revolutionary, high-payoff research that bridges the gap between fundamental discoveries and their military use.

3. RELEVANCE AND AGGRESSIVENESS OF INTERMEDIATE MILESTONES AND GNG METRICS IN AN EFFICIENT TIME FRAME

The relevance and aggressiveness of the intermediate milestones and Go/No Go metrics proposed in the development schedule in an efficient time frame will be evaluated.

4. PLANS AND CAPABILITY TO ACCOMPLISH TECHNOLOGY TRANSITION

The capability to transition the technology to the research, industrial, and operational military communities in such a way as to enhance U.S. defense, to include the extent to which IP being delivered with less than unlimited rights, creates a barrier to technology transition.

5. OFFEROR'S CAPABILITIES AND/OR RELATED EXPERIENCE

The proposer's prior experience in similar efforts must clearly demonstrate an ability to deliver products that meet the proposed technical performance within the proposed budget and schedule. The proposed team has the expertise to manage the cost and schedule. Similar efforts completed/ongoing by the proposer in this area are fully described including identification of other Government sponsors.

6. REALISM OF PROPOSED SCHEDULE

The offerors' abilities to aggressively pursue performance metrics in the shortest timeframe and to accurately account for that timeframe will be evaluated.

7. COST REASONABLENESS AND REALISM

The objective of this criterion is to establish that the proposed costs are reasonable and realistic for the technical and management approach offered, as well as to determine the proposer's practical understanding of the effort. This will be principally measured by cost per labor-hour and number of labor-hours proposed. The evaluation criterion recognize that undue emphasis on cost may motivate proposers to offer low-risk ideas with minimum uncertainty and to staff the effort with junior personnel in order to be in a more competitive posture. DARPA discourages such cost strategies. Cost reduction approaches that will be received favorably include innovative management concepts that maximize direct funding for technology and limit diversion of funds into overhead.

Award(s) will be made to proposers whose proposals are determined to be the most advantageous to the Government, all factors considered, including the potential contributions of the proposed work to the overall research program and the availability of

funding for the effort. Award(s) may be made to any proposer(s) whose proposal(s) is determined selectable regardless of its overall rating.

NOTE: PROPOSERS ARE CAUTIONED THAT EVALUATION SCORES MAY BE LOWERED AND/OR PROPOSALS REJECTED IF SUBMITTAL INSTRUCTIONS ARE NOT FOLLOWED.

As soon as the proposal evaluation is completed, the proposer will be notified of selectability or non-selectability. Selectable proposals will be considered for funding; non-selectable proposals will be destroyed. (One copy of non-selectable proposals may be retained for file purposes.) The Government reserves the right to select for award all, some, or none of the proposals received and to make awards without discussions. In the event that DARPA desires to award only portions of a proposal, negotiations will be opened with that proposer. All responsible sources capable of satisfying the Government's needs may submit a proposal which shall be considered by DARPA.

Proposals identified for funding may result in a procurement contract, grant, cooperative agreement, or other transaction depending upon the nature of the work proposed, the required degree of interaction between parties, and other factors. If warranted, portions of resulting awards may be segregated into pre-priced options.

The cost of preparing proposals in response to this announcement is not considered an allowable direct charge to any resulting contract or any other contract. Proposers are warned that only Contracting Officers are legally authorized to commit the Government.

TEAMING ARRANGEMENTS

Teaming is strongly encouraged and teaming arrangements should be explained clearly in the proposal abstracts and full proposals. Integrated teams capable of addressing different technological and scientific aspects of the Electromagnetic Pulse Tolerant Microwave Receiver Front-End program will be highly valued. Teams composed of partners from industry, academia and national laboratories are encouraged. While innovative proposals from small groups will be considered, a website (<http://www.davincinetbook.com/teams>) will be established to facilitate teaming between interested parties. Specific information content, communications, networking, and team formation are the sole responsibilities of the participants. Neither DARPA nor the Department of Defense (DoD) endorses the destination website or the information and organizations contained therein, nor does DARPA or the DoD exercise any responsibility at the destination. This website is provided consistent with the stated purpose of this BAA.

PROPOSER'S QUESTIONS

A "Proposer's Questions" website will be posted for BAA 07-45 on the DARPA, Microsystems Technology Office solicitations page (www.darpa.mil/baa/#eto). If you would like to have a question answered and posted on this site, please send your question to the following address: BAA07-45@darpa.mil.

FORMAT AND SUBMITTAL

The form and format for proposals follows below. Proposals that do not satisfy these form and format requirements may be rejected without further review or evaluation. All submissions should be in the English language. Proposals should also be submitted electronically accompanied by a transmittal letter signed by an official who is authorized to commit the offeror. Electronic copies should be in Microsoft Word format or PDF and submitted via a web site interface: Web Site: <https://www.tfims.darpa.mil/baa>. University (prime) grant submissions may be made via the Grants.gov web site, <http://www.grants.gov/>, by using the "Apply" function. Proposals received by MTO but not submitted specifically to the BAA may be considered under the BAA.

PROPOSAL FORMAT

All full proposals must be in the following format. Nonconforming proposals may be rejected without review. Proposals shall consist of two volumes. All pages shall be printable on 8-1/2 by 11 inch paper with type not smaller than 12 point. The page limitation for full proposals includes all figures, tables, and charts. Volume I, Technical and Management Proposal, may include an attached bibliography of relevant technical papers or research notes (published and unpublished) which document the technical ideas and approach upon which the proposal is based. Copies of not more than three (3) relevant papers can be included with the submission. The bibliography and attached papers are not included in the page counts given below. The submission of other supporting materials along with the proposal is strongly discouraged and will not be considered for review. Except for the attached bibliography, Volume I shall not exceed forty-five (53) pages, not including Section IV. Maximum page lengths for each section are shown in braces { } below.

Volume I, Technical and Management Proposal

Section I. Administrative

A. {1} **Cover sheet.** This should include: (1) BAA number; (2) Technical area; (3) Lead Organization Submitting proposal; (4) Type of business, selected among the following categories: "LARGE BUSINESS", "SMALL DISADVANTAGED BUSINESS", "OTHER SMALL BUSINESS", "HBCU", "MI", "OTHER EDUCATIONAL", or "OTHER NONPROFIT"; (5) Contractor's reference number (if any); (6) Other team members (if applicable) and type of business for each; (7) Proposal title; (8) Technical point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available); (9) Administrative point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available), total funds requested from DARPA, and the amount of cost-share (if any); and (10) Date proposal was prepared.

B. {1} **Official transmittal letter.**

Table of Contents:

Section II. Summary of Proposal

- A. {2} **Executive Summary.** This should clearly and concisely summarize the following:
- The quantitative end-of-program performance goals and the milestones associated with each Phase of the development effort.
 - An explanation of how the above goals and milestones compare to what has already been demonstrated.
 - A description of the unique approaches and technical solutions proposed.

Section III. Detailed Proposal Information

- A. {15} **Technical Rationale & Approach.** A concise section outlining the scientific and technical challenges, unique approaches, and potential anticipated technical solutions to the challenges that will be addressed. This statement should demonstrate that the proposer has a clear understanding of the state-of-the-art; and should provide sufficient technical details so as to permit complete evaluation of the feasibility of the idea. Proposers should specifically address the practical *and* fundamental performance limits in operational parameters of the envisioned robust and sensitive microwave receiver front-end. This discussion should be based on data, simulations, and/or calculations.
- B. {12 + 1 for table} **Program Plan & Risk Assessment.** A narrative explaining the explicit timelines, milestone achievements, and quantitative metrics by which progress toward the goals can be evaluated. This plan should include a specific and detailed test plan detailing how performance of milestones, particularly the GNG metrics, will be measured. The proposed period of performance of the overall program and specifically of each program phase and demonstration should be clearly stated. Milestones must be associated with demonstrable, quantitative measures of performance, and should be summarized in a single table. **Measurable milestones should occur every six months after start of effort.** This section should also identify major technical risk elements specific to the proposed approach, estimate the risk magnitude for each such element, and describe specific plans to mitigate risk. Proposers shall clearly define all deliverables associated with the proposed research; all proprietary assertions to intellectual property of all types, including any background inventions, shall be set forth in detail. (See Volume 2, Section D, Intellectual Property.)
- C. {12} **Statement of Work (SOW)** A section written in plain English, outlining the scope of the effort (by Phase, as applicable) and citing specific tasks to be performed and specific contractor performance/task requirements and deliverables.
- D. {3} **Teaming & Management Plan.** A management plan that describes how the different members of the team will collaborate to demonstrate viable solutions to the program challenges.
- E. {4} **Capabilities.** A section describing relevant prior work, the background, qualifications and relevant experience of key individuals to be assigned to the program and the facilities and equipment to be utilized. Please do not attach supporting material (CDs, movies, etc.) to the proposal, except as noted in Section IV below.
- F. {2} **Technology Transition.** A discussion outlining how the technology to be developed in this program will be commercialized and made available to DoD and its contractors.

- G. {5} **Slide Summary.** PowerPoint-type slides (i.e., landscape formatted for presentation) that succinctly highlight the major aspects of the proposal in a manner suitable for presentation to DARPA management.

Section IV. Additional Information {Optional}

- A. A brief bibliography of relevant technical papers and research notes (published and unpublished) which document the technical ideas upon which the proposal is based may be provided. Copies of not more than three (3) relevant papers can be included in the submission. This section does not count towards the overall page limit for Volume I.

Volume II, Cost Proposal – {No page limit}

- A. Cover sheet to include: (1) BAA number; (2) Technical area; (3) Lead Organization Submitting proposal; (4) Type of business, selected among the following categories: "LARGE BUSINESS", "SMALL DISADVANTAGED BUSINESS", "OTHER SMALL BUSINESS", "HBCU", "MI", "OTHER EDUCATIONAL", or "OTHER NONPROFIT"; (5) Contractor's reference number (if any); (6) Other team members (if applicable) and type of business for each; (7) Proposal title; (8) Technical point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available); (9) Administrative point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), and electronic mail (if available); (10) Award instrument requested: cost-plus-fixed-fee (CPFF), cost-contract--no fee, cost sharing contract--no fee, or other type of procurement contract (specify), grant, cooperative agreement, or other transaction; (11) Place(s) and period(s) of performance; (12) Total proposed cost separated by basic award and option(s) (if any); (13) Name, address, and telephone number of the offeror's cognizant Defense Contract Management Agency (DCMA) administration office (if known); (14) Name, address, and telephone number of the offeror's cognizant Defense Contract Audit Agency (DCAA) audit office (if known); (15) Date proposal was prepared; (16) the offeror's Contractor and Government Entity (CAGE) Code, Dun and Bradstreet (DUN) Number, North American Industrial Classification System (NAICS) Number, and Tax Identification Number (TIN); and (17) Proposal Expiration Date.
- B. Detailed cost breakdown to include: (1) total program cost broken down by major cost items (direct labor, indirect rates/factors, subcontracts and/or consultants, materials and/or equipment, travel/other direct costs, etc.) and further broken down by year; (2) major program tasks by year; (3) an itemization of major subcontracts* and material and/or equipment purchases; (4) direct labor itemized by individual labor categories; (5) an itemization of any information technology (IT)* purchases; (6) a summary of

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- IT is defined as "any equipment, or interconnected system(s) or subsystem(s) of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the agency. (a) For purposes of this definition, equipment is used by an agency if the equipment is used by the agency directly or is used by a contractor under a contract with the agency which – (1) Requires the use of such equipment; or (2) Requires the use, to a significant extent, of such equipment in the performance of a service or the furnishing of a product. (b) The term "information

projected funding requirements by month; and (7) the source, nature, and amount of any industry cost-sharing. Where the effort consists of multiple portions which could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each.

*To include similar cost breakdown as required by the offeror (prime).

- C. Supporting cost and pricing information, to include subcontractor proposals and associated backup documentation, in sufficient detail to substantiate the summary cost estimates in B. above. Include a description of the method used to estimate costs and supporting documentation. Note: “cost or pricing data” as defined in FAR Subpart 15.4 shall be required if the offeror is seeking a procurement contract award of \$650,000 or greater unless the offeror requests an exception from the requirement to submit cost or pricing data. “Cost or pricing data” are not required if the offeror proposes an award instrument other than a procurement contract (e.g., a grant, cooperative agreement, or other transaction). Please also provide any Forward Pricing Rate Agreement, other such Approved Rate Information (e.g., Rate Memo’s, etc.), or such other documentation that may assist in expediting negotiations (if not available, state so). All proprietary subcontractor proposal documentation of which cannot be uploaded to TFIMS shall be made immediately available to the Government, upon request, under separate cover (i.e., mail, electronic/email, etc.), either by the Proposer or by the subcontractor organization.

INTELLECTUAL PROPERTY

1. Procurement Contract Proposers
 - a. Noncommercial Items (Technical Data and Computer Software)

Proposers responding to this BAA requesting a procurement contract to be issued under the FAR/DFARS, shall identify all noncommercial technical data, and noncommercial computer software that it plans to generate, develop, and/or deliver under any proposed award instrument in which the Government will acquire less than unlimited rights, and to assert specific restrictions on those deliverables. Proposers shall follow the format under DFARS 252.227-7017 for this stated purpose. In the event that proposers do not submit the list, the Government will assume that it automatically has “unlimited rights” to all noncommercial technical data and noncommercial computer software generated, developed, and/or delivered under any award instrument, unless it is substantiated that

technology” includes computers, ancillary, software, firmware and similar procedures, services (including support services), and related resources. (c) The term “information technology” does not include – (1) Any equipment that is acquired by a contractor incidental to a contract; or (2) Any equipment that contains imbedded information technology that is used as an integral part of the product, but the principal function of which is not the acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. For example, HVAC (heating, ventilation, and air conditioning) equipment such as thermostats or temperature control devices, and medical equipment where information technology is integral to its operation, are not information technology.”

development of the noncommercial technical data and noncommercial computer software occurred with mixed funding. If mixed funding is anticipated in the development of noncommercial technical data, and noncommercial computer software generated, developed, and/or delivered under any award instrument, then proposers should identify the data and software in question, as subject to Government Purpose Rights (GPR). In accordance with DFARS 252.227-7013 Rights in Technical Data - Noncommercial Items, and DFARS 252.227-7014 Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation, the Government will automatically assume that any such GPR restriction is limited to a period of five (5) years in accordance with the applicable DFARS clauses, at which time the Government will acquire “unlimited rights” unless the parties agree otherwise. Proposers are admonished that the Government will use the list during the source selection evaluation process to evaluate the impact of any identified restrictions, and may request additional information from the proposer, as may be necessary, to evaluate the proposer’s assertions. If no restrictions are intended, then the proposer should state “NONE.”

A sample list for complying with this request is as follows:

NONCOMMERCIAL			
Technical Data Computer Software To be Furnished With Restrictions	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(LIST)	(LIST)	(LIST)

b. Commercial Items (Technical Data and Computer Software)

Proposers responding to this BAA requesting a procurement contract to be issued under the FAR/DFARS, shall identify all commercial technical data, and commercial computer software that may be embedded in any noncommercial deliverables contemplated under the research effort, along with any applicable restrictions on the Government’s use of such commercial technical data and/or commercial computer software. In the event that proposers do not submit the list, the Government will assume that there are no restrictions on the Government’s use of such commercial items. The Government may use the list during the source selection evaluation process to evaluate the impact of any identified restrictions, and may request additional information from the proposer, as may be necessary, to evaluate the proposer’s assertions. If no restrictions are intended, then the proposer should state “NONE.”

A sample list for complying with this request is as follows:

COMMERCIAL			
Technical Data Computer Software To be Furnished With Restrictions	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(LIST)	(LIST)	(LIST)

2. NonProcurement Contract Proposers - Noncommercial and Commercial Items (Technical Data and Computer Software)

Proposers responding to this BAA requesting a Grant, Cooperative Agreement, Technology Investment Agreement, or Other Transaction for Prototype shall follow the applicable rules and regulations governing these various award instruments, but in all cases should appropriately identify any potential restrictions on the Government's use of any Intellectual Property contemplated under those award instruments in question. This includes both Noncommercial Items and Commercial Items. Although not required, proposers may use a format similar to that described in Paragraphs 1.a and 1.b above. The Government may use the list during the source selection evaluation process to evaluate the impact of any identified restrictions, and may request additional information from the proposer, as may be necessary, to evaluate the proposer's assertions. If no restrictions are intended, then the proposer should state "NONE."

3. All Proposers – Patents

Please include documentation proving your ownership of or possession of appropriate licensing rights to all patented inventions (or inventions for which a patent application has been filed) that will be utilized under your proposal for the DARPA program. If a patent application has been filed for an invention that your proposal utilizes, but the application has not yet been made publicly available and contains proprietary information, you may provide only the patent number, inventor name(s), assignee names (if any), filing date, filing date of any related provisional application, and a summary of the patent title, together with either: 1) a representation that you own the invention, or 2) proof of possession of appropriate licensing rights in the invention.

4. All Proposers-Intellectual Property Representations

Please provide a good faith representation that you either own or possess appropriate licensing rights to all other intellectual property that will be utilized under your proposal for the DARPA program. Additionally, offerors shall provide a short summary for each item asserted with less than unlimited rights that describes the nature of the restriction and the intended use of the intellectual property in the conduct of the proposed research.

GUIDANCE FOR CLASSIFIED INFORMATION AND DATA

The Government anticipates that proposals submitted under a BAA will be unclassified. In the event that a proposer chooses to submit a classified proposal or submit any documentation that may be classified, the following information is applicable.

Security Classification guidance on DD Form 254 will not be provided at this time since DARPA is soliciting ideas only. After reviewing the incoming proposals, if a determination is made that the award instrument may result in access to classified information; a DD Form 254 will be issued and attached as part of the award. Proposers choosing to submit a classified proposal must first receive permission from the Original Classification Authority to use their

information in applying to this BAA. An applicable classification guide should be submitted to ensure that the proposal is protected appropriately.

Classified submissions shall be in accordance with the following guidance:

Collateral Classified Data: Use classification and marking guidance provided by previously issued security classification guides, the Information Security Regulation (DoD 5200.1-R), and the National Industrial Security Program Operating Manual (DoD 5220.22-M) when marking and transmitting information previously classified by another original classification authority. Classified information at the Confidential and Secret level may only be mailed via U.S. Postal Service (USPS) Registered Mail or U.S. Postal Service Express Mail (USPS only; not DHL, UPS or FedEx). All classified information will be enclosed in opaque inner and outer covers and double wrapped. The inner envelope shall be sealed and plainly marked with the assigned classification and addresses of both sender and addressee. The inner envelope shall be addressed to:

Defense Advanced Research Projects Agency (DARPA)
ATTN: BAA07-45, DARPA/MTO, Dr. Steve Pappert
3701 North Fairfax Drive, Suite 507
Arlington, VA 22203-1714

The outer envelope shall be sealed with no identification as to the classification of its contents and addressed to:

Defense Advanced Research Projects Agency (DARPA)
Security & Intelligence Directorate, Attn: CDR
3701 North Fairfax Drive, Suite 832
Arlington, VA 22203-1714

All Top Secret materials should be hand carried via an authorized, two-person courier team to the DARPA Classified Document Registry (CDR).

Special Access Program (SAP) Information: Contact the DARPA Program Security Support Center (PSSC) at 703-812-1962/1970 for further guidance and instructions prior to transmitting to DARPA. All Top Secret SAP must be transmitted via approved methods for such material. Consult the DoD Overprint to the National Industrial Security Program Operating Manual for further guidance. It is strongly recommended that you coordinate the transmission of SAP material and information with the DARPA PSSC prior to transmission.

Sensitive Compartmented Information (SCI) Data: Contact the DARPA Special Security Contact Office (SSCO) at 703-812-1993/1994 for the correct SCI courier address and instructions. All SCI should be transmitted through your servicing Special Security Officer (SSO) / Special Security Contact Officer (SSCO). All SCI data must be transmitted through your servicing Special Security Officer (SSO) / Special Security Contact Officer (SSCO). All SCI data must be transmitted through SCI channels only (i.e., approved SCI Facility to SCI facility via secure fax).

Proprietary Data: All proposals containing proprietary data should have the cover page and each page containing proprietary data clearly marked as containing proprietary data. It is the proposer's responsibility to clearly define to the Government what is considered proprietary in nature.

Proposers must have existing and in-place prior to execution of an award, approved capabilities (personnel and facilities) to perform research and development at the classification level they propose.

AWARD ADMINISTRATION INFORMATION

(1) Central Contractor Registration. Selected proposers not already registered in the Central Contractor Registry (CCR) will be required to register in CCR prior to any award under this BAA. Information on CCR registration is available at <http://www.ccr.gov>.

(2) Representations and Certifications. In accordance with Federal Acquisition Regulation 4.1201, prospective proposers shall complete electronic annual representations and certifications at <http://orca.bpn.gov>.

(3) Wide Area WorkFlow (WAWF). Unless using another approved electronic invoicing system, performers will be required to submit invoices for payment directly via the Internet/WAWAF at <http://wawf.eb.mil>. Registration to WAWF will be required prior to any award under this BAA.

PUBLIC RELEASE OR DISSEMINATION OF INFORMATION

The following provision will be incorporated into any resultant contract:

(a) There shall be no dissemination or publication, except within and between the Contractor and any subcontractors, of information developed under this contract or contained in the reports to be furnished pursuant to this contract without prior written approval of the DARPA Technical Information Officer (DARPA/TIO). All technical reports will be given proper review by appropriate authority to determine which Distribution Statement is to be applied prior to the initial distribution of these reports by the Contractor. Papers resulting from unclassified contracted fundamental research are exempt from prepublication controls and this review requirement, pursuant to DoD Instruction 5230.27 dated October 6, 1987.

(b) When submitting material for written approval for open publication as described in subparagraph (a) above, the Contractor must submit a request for public release request to the DARPA TIO and include the following information: 1) Document Information: document title, document author, short plain-language description of technology discussed in the material (approx 30 words), number of pages (or minutes of video) and document type (briefing, report, abstract, article, or paper); 2) Event Information: event type (conference, principle investigator meeting, article or paper), event date, desired date for DARPA's approval; 3) DARPA Sponsor: DARPA Program Manager, DARPA office, and contract number; and 4) Contractor's Information: POC name, e-mail and phone. Allow four weeks for processing; due dates under four weeks require a justification. Unusual electronic file

formats may require additional processing time. Requests can be sent either via e-mail to tio@darpa.mil or via 3701 North Fairfax Drive, Arlington VA 22203-1714, telephone (571) 218-4235. Refer to www.darpa.mil/tio for information about DARPA's public release process.

EXPORT LICENSES

The following provision will be incorporated into any resultant contract:

Should this project develop beyond fundamental research (basic and applied research ordinarily published and shared broadly within the scientific community) with military or dual-use applications the following apply:

- (1) The contractor shall comply with all U. S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, for obtaining the appropriate licenses or other approvals, if required, for exports of (including deemed exports) hardware, technical data, and software, or for the provision of technical assistance.
- (2) The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed on-site at any Government installation (whether in or outside the United States), where the foreign person will have access to export-controlled technical data or software.
- (3) The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.
- (4) The Contractor shall be responsible for ensuring that the provisions of this clause apply to its subcontractors.

SUBCONTRACTING

Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. 637(d)), it is the policy of the Government to enable small business and small disadvantaged business concerns to be considered fairly as subcontractors to contractors performing work or rendering services as prime contractors or subcontractors under Government contracts, and to assure that prime contractors and subcontractors carry out this policy. Each proposer who submits a contract proposal and includes subcontractors is required to submit a subcontracting plan IAW FAR 19.702(a) (1) and (2) should do so with their proposal. The plan format is outlined in FAR 19.704.

CONFIDENTIALITY

It is the policy of DARPA to treat all proposals as competitive information and to disclose their contents only for the purpose of evaluation. No proposals will be returned. The original of each proposal received will be retained at DARPA and all other copies of non-selected proposals

destroyed. Documentation related to the source selection process will be marked SOURCE SELECTION INFORMATION – SEE FAR 2.101 AND 3.104.

PROCUREMENT INTEGRITY, STANDARDS OF CONDUCT, ETHICAL CONSIDERATIONS, AND ORGANIZATIONAL CONFLICTS OF INTEREST (OCIs)

Certain post-employment restrictions on former federal officers and employees may exist, including special Government employees (including but not limited to Sections 207 and 208 of Title 18, United States Code, the Procurement Integrity Act, 41 U.S.C. 423, and FAR 3.104). Accordingly, the DARPA Program Manager responsible for this BAA is not assigned under the IPA program, and DARPA is unaware, at the time of publication of this BAA, of any other likely potential conflicts of interest with any potential offerors. However, prior to the start of proposal evaluations, the Government will assess whether any potential conflict of interest exists in regards to the DARPA Program Manager as well as those individuals chosen to evaluate proposals received under this BAA.

All proposers and proposed sub-contractors must affirm whether they are providing scientific, engineering, and technical assistance (SETA) or similar support to any DARPA technical office(s) through an active contract or subcontract, including those such contracts being managed by outside DARPA contracting agents. All affirmations must state which office(s) the proposer supports and identify the prime contract numbers. Affirmations shall be furnished at the time of proposal submission. All facts relevant to the existence or potential existence of organizational conflicts of interest (FAR 9.5.) must be disclosed. The disclosure shall include a description of the action the proposer has taken or proposes to take to avoid, neutralize, or mitigate such conflict (e.g., Mitigation Plan). Should the Government determine that a potential organizational conflict of interest exists of which the offeror did not provide a mitigation plan, such plan may be requested by the Government during proposal evaluation(s). If the situation cannot be mitigated by the contractor, the proposal may be returned without technical evaluation and withdrawn from consideration for award under this BAA.